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A Study of Apical Pits Using Shed Snakeskins Revisited

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Abstract

A total of 585 shed snakeskins of 31 genera, representing 54 species of North American snakes, were examined for the presence of apical pits. Twenty-three genera had at least one species with observable apical pits. Of the 54 species studied, 41 had observable apical pits on at least one section of shed snakeskin. Shed snakeskins from three species (*Chionactis occipitalis*, *Clonophis kirtlandii* and *Thamnophis proximus*) appeared to lack apical pits, despite these structures being reported present on the actual snakes. To increase the likelihood of observing apical pits several suggestions are provided, and include: use of both actual snakes and shed snakeskins; examination of all regions (nape, midbody and tail) of specimens (actual snakes or shed skins); the use of as large a sample as possible; and the use of various magnifications as well as variable intensity and angle of illumination.

Introduction

Apical pits are minute epidermal depressions found on or near the apex of dorsal scales of some snake species. They may be single or paired (Figure 1a, b), and in some instances three or more may occur on a single scale. In a previous publication, Gray (2006) presented data regarding the presence or absence of apical pits, acquired from the examination of 279 shed snakeskins. Represented in that publication were 32 species and 21 genera of North American snakes. Of the 32 species then examined, 25 (78%) had visible apical pits on at least one shed snakeskin. Herein, I wish to augment the findings of the previous report by presenting data that resulted from the study of an additional 306 shed snakeskins. Along with the original data, a total of 585 shed snakeskins representing 31 genera and 54 species of snakes were examined.

Materials and Methods

Shed snakeskins (n = 585) of 31 genera, representing 54 species of North American snakes, were examined for the presence of apical pits. Shed skins were acquired in the field or obtained from specimens held in captivity. Only shed skins containing material for study of the nape, midbody and tail regions were used. Suitable shed skins were cut, moistened with 70% isopropyl alcohol, spread on perforated plastic sheets, blotted dry, and then pressed in a plant press for approximately 24 hours (Gray, 2005). After being pressed, sections of the nape, midbody and tail were examined with a dissecting microscope at 10× and 30× magnification, and with incident fluorescent and transmitted fluorescent illumination.

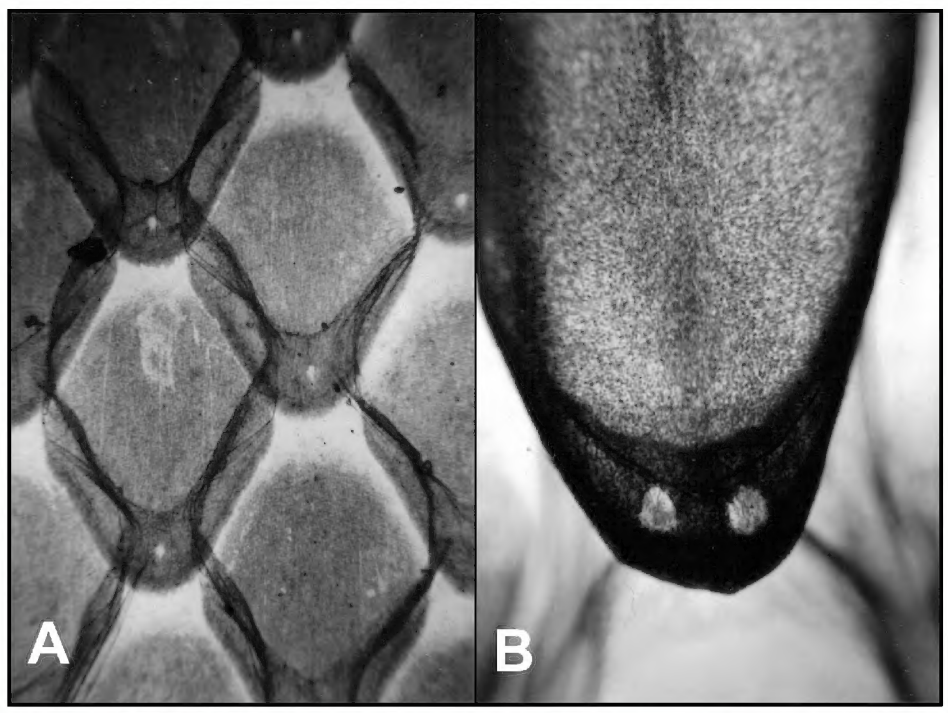

Figure 1. A) Single apical pits as seen on scales from a shed snakeskin of *Diadophis punctatus* (BG 140) 50× magnification. B) Paired apical pits as seen on a scale from a shed snakeskin of *Scotophis spiloides* (BG 085) 50× magnification.

Results and Discussion

Of the 31 genera studied, 24 (77%) had at least one species with apical pits observed, while 41 of the 54 species (76%) had apical pits present on at least one section of shed snakeskin (Table 1). The location of scales with apical pits on the body varied both within and between species. For example, of the 41 species with apical pits, 30 had apical pits on all regions (e.g., nape, midbody and tail); six had them on the nape and midbody; three species had apical pits on only the nape; one (*Opheodrys aestivus*) had them restricted to midbody; and one (*Thamnophis butleri*) had them restricted to the scales above the vent on the base of the tail (Gray, in prep.). In regards to genera, *Thamnophis* displayed the greatest diversity of conditions present, with three species (*T. brachystoma*, *T. ordinoides* and *T. proximus*) lacking apical pits; one species, *T. butleri* (1 of 8), displaying apical pits on only the tail; and four species (*T. elegans* [100%], *T. marcianus* [100%], *T. radix* [75%], and *T. sirtalis* [47%]) having apical pits present on scales of all regions examined. All five *Thamnophis sauritus* shed skins had apical pits present on scales of both nape and midbody, but absent on the tail. Although apical pits were not observed on the *T. proximus* shed skin that was examined, Conant (1961) reported that this species has them present on scales of the nuchal (= nape) region. Similarly, apical pits were not observed in *Chionactis occipitalis* and *Clonophis kirtlandii* shed skins despite these structures being present in actual snakes (Cope, 1900; Wright and Wright, 1957; Ernst and Ernst, 2003). Both *T. butleri* and *T. radix* had been reported to lack apical pits (Marx and Rabb, 1972). In the 41

Table 1. Presence or absence of apical pits in selected North American snakes. Location codes: A = apical pits obseved on all dorsal regions (nape, midbody and tail); M = apical pits observed on dorsal scales at midbody; N = apical pits observed on scales of the nape. T = apical pits observed on dorsal scales of the tail. O = apical pits not observed.

Taxon	# examined	# (%) with pits	Location of pits
Family Boidae			
Charina bottae	12	0 (0%)	O
Family Colubridae			
Clonophis kirtlandii	5	0 (0%)	O
Coluber constrictor	10	4 (40%)	A
Chionactis occipitalis	2	0 (0%)	O
Drymarchon melanurus	1	1 (100%)	A
Lampropeltis alterna	1	1 (100%)	A
L. calligaster	2	2 (100%)	A
L. getula	5	5 (100%)	A
L. pyromelana	2	2 (100%)	A
L. triangulum	45	44 (98%)	A
L. t. amaura	1	1	A
L. t. annulata	1	1	A
L. t. campbelli	2	2	A
L. t. elapsoides	4	4	A
L. t. gentilis	1	1	A
L. t. syspila	2	2	A
L. t. triangulum	34	33	A
Liochlorophis vernalis	10	3 (30%)	N
Masticophis flagellum	8	8 (100%)	A
Mintonius gloydi	2	2 (100%)	M
Opheodrys aestivus	6	1 (17%)	A
Pantherophis guttatus	8	8 (100%)	A
Pituophis catenifer	4	2 (50%)	A
P. melanoleucus	10	10 (100%)	A
Rhinocheilus lecontei	2	2 (100%)	N, M
Scotophis spiloides	15	15 (100%)	A
Sonora semiannulata	1	0 (0%)	O
Tantilla coronata	1	0 (0%)	O
Family Crotalidae			
Agkistrodon contortrix	7	7 (100%)	A
A. piscivorus	5	4 (80%)	A
Crotalus horridus	5	3 (60%)	N, M
C. viridis	5	3 (60%)	A
Sistrurus catenatus	5	3 (60%)	N, M
S. miliarius	9	9 (100%)	A
Family Dipsadidae			
Carphophis amoenus	7	5 (71%)	N, M
Contia longicauda	1	1 (100%)	A
C. tenuis	2	2 (100%)	A
Diadophis punctatus	33	33 (100%)	A
Rhadinaea flavilata	1	0 (0%)	O
Family Elapidae			
Micrurus fulvius	2	0 (0%)	O
Family Natricidae			
Nerodia clarkii	1	1 (100%)	A
N. erythrogaster	2	2 (100%)	N, M
N. sipedon	27	26 (96%)	A
Regina septemvittata	7	4 (57%)	A
Storeria dekayi	107	29 (27%)	N
S. occipitomaculata	22	7 (32%)	N
Thamnophis brachystoma	47	0 (0%)	O
T. butleri	8	1 (12%)	T
T. elegans	1	1 (100%)	A
T. marcianus	1	1 (100%)	A
T. ordinoides	2	0 (0%)	O
T. proximus	1	0 (0%)	O
T. radix	4	3 (75%)	A
T. sauritus	5	5 (100%)	N, M
T. sirtalis	90	42 (47%)	A
Virginia pulchra	8	0 (0%)	O
V. valeriae	1	0 (0%)	O
Family Xenodontidae			
Farancia abacura	1	0 (0%)	O
Heterodon nasicus	13	9 (69%)	A
H. platirhinos	2	2 (100%)	A
H. simus	1	1 (100%)	A
Totals	585	314 (54%)	

Table 1 (cont'd).

species with apical pits, the percentage of shed snakeskins with observable pits varied between 12% in *Thamnophis butleri* to 100% in 28 species (see Table 1). Apical pits were relatively more common in species with keeled scales (81.8% had apical pits) compared to smooth scaled species (66.7% had apical pits). Marx and Rabb (1972) previously noted a relatively greater number of species with aquatic or secretive habits lacked apical pits. In support of this they also cited the complete absence of apical pits in the Elapinae and the aquatic Hydrophiinae.

The function of apical pits in snakes has remained elusive. Chiasson (1981) speculated that apical pits served a functional role by anchoring the old stratum corneum to the inner epidermal layer, thereby preventing the outer layer from being shed prematurely during ecdysis. Incidentally, however, apical pits are not necessary for preventing premature shedding. If they were, one might expect snakes without apical pits (e.g., elapids) to prematurely shed their stratum corneum. This certainly is not the case. In common garter snakes (*T. sirtalis*) individuals without apical pits appear to shed just as well as conspecifics with apical pits. Furthermore, merolepid (partially scaleless) *T. sirtalis*, which lack not only apical pits, but also most of the dorsal scales (Figure 2a, b), tend to shed normally; the only exception being the occasional tendency for the shed skin to roll up as it is sloughed, subsequently causing a constriction at midbody. The shed skin in these snakes does not, however, prematurely detach ahead of the cleaving region of stratum corneum (pers. obs.).

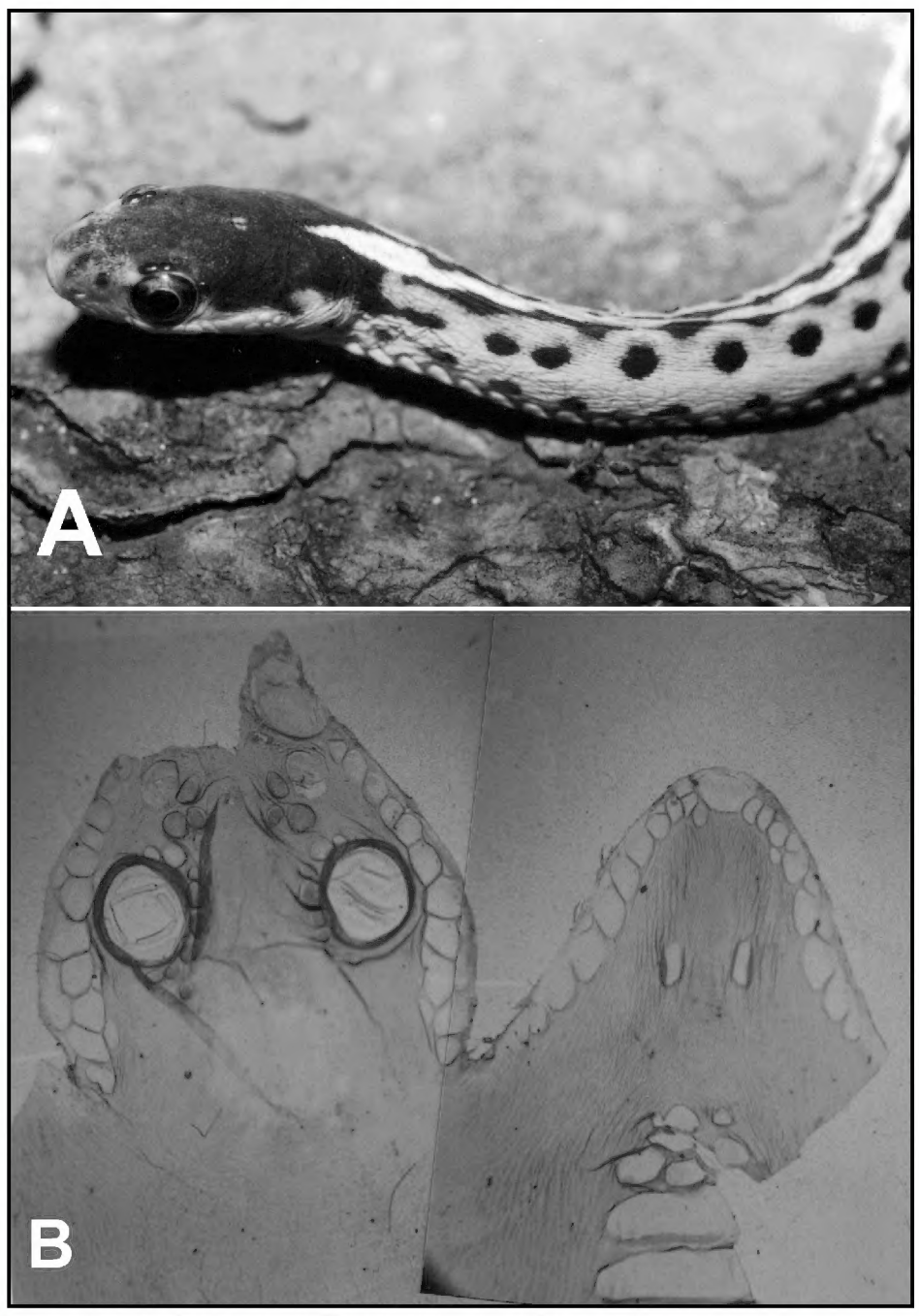

Figure 2. A) Merolepid *Thamnophis sirtalis*; note the lack of most dorsal scales; B) Shed skin of a merolepid *T. sirtalis*.

Parker and Grandison (1977) noted that the keratinous layer in the region of apical pits was much thinner and that the underlying epidermis was richly provided with bundles of nerve fibers. They speculated that apical pits may act as heat receptors; Underwood (1967) proposed a similar claim. Many snakes besides pit vipers and pythons are capable of sensing infrared radiation via nerve endings in the skin of the head (Breidenbach, 1990, cited in Pough et al., 2001). It is rather interesting to note that in several species (e.g., *Diadophis punctatus*, *Liochlorophis vernalis*, *Nerodia sipedon*, *Thamnophis sauritus*) the apical pits are non-pigmented in the stratum corneum, while in the dermis below the pits there is a concentration of melanin (see Figure 1 in Gray [2006]). It seems reasonable to assume that the darkly pigmented area would absorb more infrared radiation than the lighter surrounding area. Another possibility is that they are light receptors, which might allow a basking snake to detect a predator by its shadow, if it should happen to fall upon an area with apical pits. In at least one seasnake, a light-sensitive region on the tail has been described (Vitt and Caldwell, 2009). Seasnakes, however, lack apical pits.

Smith (1964) noted that in some extant species of lizards a tiny hair-like filament (an apical bristle) protrudes from the bottom of each pit and is presumably of tactile function. Examples of the variation of apical pits in lizards can be seen in Scortecci (1940) and Fuchs and Fuchs (2003). In appearance, the sensory pits on the scales of varanid lizards most closely resemble the apical pits of snakes. In *Varanus*, however, sensory pits are also present on the ventral scales; conversely, apical pits have never been found on the ventral scales of any snake. Finally, Proske (1969) found vibration sensitive mechanoreceptors in the skin of an elapid, *Pseudechis porphyriacus*. The responses to vibration were identified in simple nerve endings in the belly and dorsum, as well as in the mandibular and maxillary branches of the trigeminal nerve. While elapids may lack apical pits, the existence of vibration-sensitive mechanoreceptors in the skin of *P. porphyriacus*, the discovery of a light-sensitive region in the tail of a seasnake, and the supposed tactile function of apical pits in lizards, all suggest that the possibility of a sensory or tactile function for apical pits in snakes should not be ruled out. Regardless of their function, the enormous amount of inter- and intraspecific variation in the occurrence of apical pits is puzzling. Much more work is needed before we can claim a definite function for these structures.

In order to maximize the likelihood of verifying the presence of apical pits in a given taxon, the following recommendations are provided. Although apical pits are usually more easily observed in shed snakeskins (Gloyd and Conant, 1990), this is not true of all species (e.g., *Chionactis occipitalis* and *Clonophis kirtlandii*). Therefore, shed skins as well as actual snakes (preferably live or recently preserved) should be examined. The nape, midbody and tail regions should be examined, as some species may have apical pits restricted to certain areas of the body. The sample size should be as large as possible. Butler's garter snake exemplifies why sample size is so important; of eight shed snakeskins of this species examined, only one was found to have pits. Since apical pits are more difficult to observe in juvenile specimens, it is recommended that adult snakes and/or their shed skins be utilized in studies documenting the presence or absence

of apical pits. Furthermore, because the ability to observe apical pits on shed snakeskins can be affected by the method used for preservation (e.g., laminating); it may be beneficial to use both mounted and unmounted material. Similarly, apical pits can be difficult to locate in specimens that have been preserved in alcohol or formalin for a long period of time. Finally, the use of variable light intensities and angles of illumination, along with different magnifications, should be tried in order to increase the chances of observing apical pits in those species whose pits may be difficult to detect.

Acknowledgments

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Literature Cited

Breidenbach, C. H. 1990. Thermal cues influence strikes in pitless vipers. J. Herpetology 24(4):448-450.

Chiasson, R. B. 1981. The apical pits of *Agkistrodon*. Journal of the Arizona-Nevada Academy of Science 16(3):69-73.

Conant, R. 1961. A new water snake from Mexico, with notes on anal plates and apical pits in *Natrix* and *Thamnophis*. American Museum Novitates 2060.

Cope, E. D. 1900. The crocodilians, lizards, and snakes of North America. Pp. 153-1270. *In*: Report of the U. S. National Museum for the year ending June 30, 1898.

Ernst, C. H., and E. M. Ernst. 2003. Snakes of the United States and Canada. Washington, D.C.: Smithsonian Books.

Fuchs, K., and M. Fuchs. 2003. The reptile skin: A key feature in the identification of lizards and snakes. Frankfurt am Main, Germany: Edition Chimaira.

Gloyd, H., and R. Conant. 1990. Snakes of the *Agkistrodon* complex. Oxford, Ohio: Society for the Study of Amphibians and Reptiles. Contributions to Herpetology Number 6.

Gray, B. S. 2005. The serpent's cast: A guide to the identification of shed skins from snakes of the Northeast and Mid-Atlantic states. The Center for North American Herpetology Monograph Number 1.

————. 2006. A study of apical pits using shed snakeskins. Bull. Chicago Herp. Soc. 41(5):85-88.

————. In prep. Natural history notes: *Thamnophis butleri* (Butler's Garter Snake). Morphology. Herpetological Review.

Marx, H., and G. B. Rabb. 1972. Phyletic analysis of fifty characters of advanced snakes. Fieldiana Zoology 63:1-321.

Parker, H. W., and G. C. Grandison. 1977. Snakes: A natural history. Ithaca, New York: Cornell University Press.

Pough, F. H., R. M. Andrews, J. E. Cadle, M. L. Crump, A. H. Savitzky and K. D. Wells. 2001. Herpetology. Second edition. Upper Saddle River, New Jersey: Prentice Hall.

Proske, U. 1969. Vibration-sensitive mechanoreceptors in snake skin. Experimental Neurology 23(2):187-194.

Scortecci, G. 1940. Recettori degli Iguanidi e di altri Sauri. Atti della Soc. Ital. di Scienze Naturali, Vol. LXXVIX (1940). Pp 1-10, 2 plates. Milano.

Smith, H. M. 1964. Evolution of chordate structure: An introduction to comparative anatomy. New York: Holt, Rinehart and Winston.

Underwood, G. 1967. A contribution to the classification of snakes. London: Trustees of the British Museum (Natural History), Publication No. 653.

Vitt, L. J., and J. P. Caldwell. 2009. Herpetology: An introductory biology of amphibians and reptiles. Third edition. Burlington, Massachusetts: Elsevier, Academic Press.

Wright, A. H., and A. A. Wright. 1957. Handbook of snakes of the United States and Canada (2 volumes). Ithaca, New York: Cornell University Press, Comstock Publishing.

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Notes on the Herpetofauna of the Northwest of Mexico: Herpetofauna of Isla El Muerto, Ensenada, Baja California, Mexico

David Lazcano [1], Gustavo Arnaud [2], Oscar Cruz [2] and Eli García-Padilla [1]

Introduction and Background

The islands of the Gulf of California are an important natural laboratory to study ecological and evolutionary models using herpetofauna as an example (Grismer 1994a,b,c,d,e; Grismer, 1999a), and they have been classified as a priority area for the conservation of biodiversity in Mexico (Vázquez-Domínguez et al., 1998). Island species need extraordinary attention because of their limited distribution, as well as being sensitive to pressure such as the destruction of habitat, the introduction of exotic species (Dodd, 1987), and the illegal extraction of species (Mellink, 1995). Given that relatively little is known about the species that are found on the islands (Grismer, 2002), it is important to define the state of conservation of each island and its species. This report describes our investigations of the herpetofauna of Isla El Muerto (also known as Miramar Island), one of many small islands belonging to Mexico in the Gulf of California.

Mexico is a megadiverse country with a high diversity of reptiles (804 species) (Flores-Villela and Canseco-Márquez, 2004). Part of this extraordinary diversity is on islands (Case, 2002; Murphy and Aguirre-Léon, 2002). Islands are fragments of natural habitat that have established, adapted, and evolved species and communities separated from the continent, and may also contain continental species along with the island species. Insular biota thus are diverse, unique in the world, and of critical importance for global biodiversity (CONABIO, 2008).

Island environments are also sites of reproduction, nesting, resting, and feeding for marine wildlife and migratory birds (Tershy and Croll, 1994). However, because most of the island species have evolved in the absence of large predators or herbivores, they have no defense or cannot compete effectively with such threats (e.g., man or invasive species), which makes them particularly sensitive and extremely vulnerable (Diamond, 1989; Sánchez-Pacheco et al., 2000).

Other megadiverse countries with island territories include: Indonesia with 16,000 islands, Philippines with 9,000 islands, Malaysia 500 islands, and Papua New Guinea with 300 islands (Atlas Geográfico Universal, 2006). There is some disagreement in the literature concerning the number of islands each country has, but the countries have one thing in common: many of the islands are uninhabited by humans, making them excellent areas to study endemic herpetofauna. Within our hemisphere the Caribbean area has produced dozens of excellent articles about evolution and species.

The islands of Gulf of California

More than 100 islands and islets were formed in the Gulf of California during the long process of separation of the Baja California peninsula from the mainland that began about 4 million years ago (Carreño and Helenes, 2002). They form an important refuge for colonies of resident and migratory birds, as well as marine mammals. They are also an important refuge for many endemic species of several other taxonomic groups, including reptiles (CONANP, 2000).

The herpetofauna of the islands in the Gulf of California comprises more than 115 species, of which almost 50% are endemic (Grismer, 1999b). In 1978 the islands of the Gulf of California were declared as a reserve and refuge areas for migratory birds and wildlife, aiming to conserve the natural resources of the islands, with an emphasis on endemic species; on 14 July 2005 the islands were incorporated into the list of the Natural Heritage of humanity by UNESCO (CONANP, 2000). Among the rattlesnakes found on Gulf of California islands, 9 species are listed in the Mexican wildlife agency with "Special Protection" (SEMARNAT, 2010). These are *Crotalus atrox*, *C. catalinensis*, *C. cerastes*, *C. enyo*, *C. mitchelli*, *C. molossus*, *C. ruber*, *C. tigris* and *C. tortugensis*.

Our Goals

Lack of information about the ecology and abundance of the Mexican insular herpetofauna makes it important to increase our knowledge of this group of vertebrates. We hope that through ecological programs in mainland Baja California we can foster greater awareness of the importance of this group of organisms and promote further protection and conservation of the islands.

Study Area

Isla El Muerto is located in the Gulf of California (Figure 1), and is relatively small, with an area of 1.3 km². The island's terrain includes rocky beaches, ravines, plateaus, hills and cliffs. Some of the island's hills are inaccessible and very high. In some

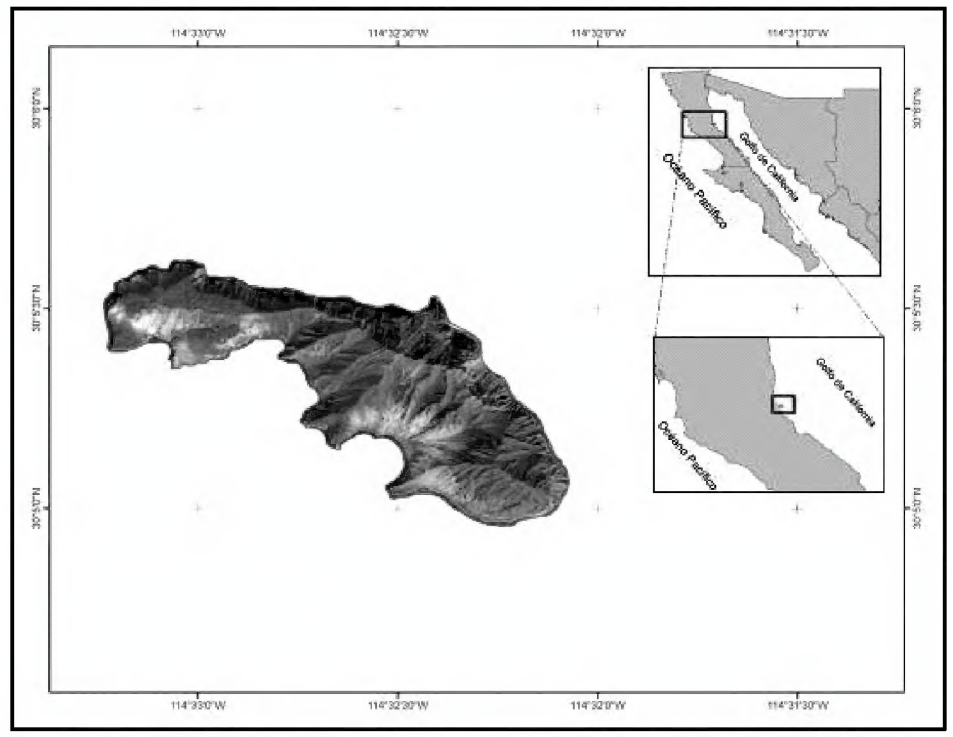

Figure 1. Physiography and location of Isla El Muerto in the Gulf of California.

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Panoramic view of El Muerto. Photograph by Eli Garcia-Padilla.

One of the island's rocky beaches. Photograph by Gustavo Arnaud.

areas it is impossible to climb. The island is located approximately 3 km from the peninsula of Baja California, Mexico, very close to the locality known as El Huerfanito, municipality of Ensenada, Baja California. The nearest large human community is San Felipe, located at a distance of 50 km. The island is uninhabited by humans, but is occasionally used by local fishermen.

Climate: Isla El Muerto is very dry. The average annual temperature in the region (eastern coast of the Peninsula and islands of the northern Gulf of California) is 23 °C; precipitation occurs primarily during the summer, fluctuating between 40 and 60 mm per year. The driest months are May and June. The highest average monthly temperatures (over 32 °C) occur in July and August, while the minimum average monthly temperature (about 15 °C) occurs in January (Minnich et al., 2000; Cavazos, 2008). In summer, soil temperature can reach 82ºC (Dimmitt, 2000). The region is poorly affected by the moderately humid winds from the southwest; this reflects its arid condition.

Geology: Isla El Muerto is made up of rocks of the middle and late Miocene, which probably broke away from the peninsula due to a geological block failure that occurred during the Pleistocene (Delgado-Argote, 2008).

Flora: The shortage of available water and the prolonged absence of rainfall are evident from the absence or scarcity of vegetation. The dominant plants in the island are desert holly (*Atriplex hymenelytra*) and needlegrass (*Stipa* sp.). There are a small number of cacti like choyas (*Cilindropuntia choya*) and cardons (*Pachycereus pringlei*) . Other plants found in low proportion are desert thorn (*Lycium* sp.), glasswort (*Salicornia* sp.), jojoba (*Jojoba* sp.) and mesquite (*Prosopis* sp.)

Mammals: Present on the island are sea lions (*Zalophus californicus*), bats (*Myotis californicus*) and deer mice (*Peromyscus maniculatus*).

Birds: The most common bird species on the island are: pelicans (*Pelecanus occidentalis*), cormorants (*Phalacrocorax* sp.), frigatebirds (*Fregata magnificens*), herons (family Ardeidae), yellow-footed gulls, (*Larus livens*), ospreys (*Pandion haliaetus*), crows (*Corvus corax*) and peregrine falcons (*Falco peregrinus*).

Methods

Three sampling visits were conducted during the dry season (March and June 2009 and May 2010), months that are the most active periods for reptiles of the island as mentioned by Grismer (2002). Sampling time was 4 nights and 5 days in each month. Reptiles were collected/observed during the day between 6:00

One of the island's plateaus, with cardons (*Pachycereus pringlei*) in the background. Photograph by Gustavo Arnaud.

The island's endemic rattlesnake, *Crotalus muertensis*, in a defensive posture. Photograph by Gustavo Arnaud.

and 12:00 hours and 19:00 to 24:00 hours. Sampling was done in beaches, canyons and mesas, looking under rocks and among vegetation. Pitfall traps were not used. The total man-hours were between 48 and 60 hours per trip.

Results

Grismer (2002) ascribed five reptile species to Isla El Muerto. However, after visiting the island on three occasions, we have added three new records, bringing the total to eight species of reptiles known from the island (see Table 1). All of the seven reptile species we saw were found at least twice and of the species reported by Grismer (2002) only *Trimorphodon biscutatus* was not found. No amphibians were seen.

Discussion

The entire Baja California peninsula, its islands and the surrounding marine environment on both slides are impressive sites for biological diversity. This has been documented by many authors, in particular for herpetofauna (Grismer, 1999a,b; Grismer, 2002). Even though Isla El Muerto is tiny compared to other islands in the area, it is extremely important to continue studying and conserving, due to the presence of *Crotalus muertensis*. The most important species to consider for conservation of the area is *Crotalus muertensis*, a snake that is microendemic to the inland. This was first described as *C. mitchelli muertensis* by Klauber (1949), but recently changed to *Crotalus muertensis* by Grismer (1999).

The island's endemic side-blotched lizard, *Uta lowei*—a male basking on the rocks. Photograph by Gustavo Arnaud.

Uta lowei is also endemic to the island (Grismer, 1994e). During our research they seemed fairly abundant in the intertidal zone close to rocky areas of the island, where they take refuge when approached.

No population study has yet been conducted for any of the species on the island. This is critical due to the island's small size and resulting vulnerability. The only species that has received attention is *C. muertensis* (Garcia-Padilla, 2010; Cruz, 2011).

Table 1. List of reptiles for El Muerto (three species found on the island for the first time during this study are marked with an asterisk).

Taxon	Remarks
Family Gekkonidae	
Phyllodactylus xanti Cope, 1863 Salamanquesa del cabo / Peninsular leaf-toed gecko	A common species on the island, found in all habitats
Family Iguanidae	
**Dipsosaurus dorsalis* (Baird & Girard, 1852) Cacharón güero / Desert iguana	Found only in canyons with sandy bottoms
Petrosaurus mearnsi (Stejneger, 1894) Lagarto de roca rayada / Banded rock lizard	Found in rocky canyons and rocky-walled beaches
Family Phrynosomatidae	
Uta lowei Grismer, 1994 Lagartija de la Isla El Muerto / El Muerto Island side-blotched lizard	Abundant in the intertidal zone, scarce in canyons and absent on the plateaus
Family Leptotyphlopidae	
**Leptotyphlops humilis* (Baird & Girard, 1863) Culebra lombriz / Western threadsnake	Found in sandy soils where there are rocks and nearby vegetation
Family Colubridae	
**Hypsiglena torquata* (Günther, 1860) Culebra nocturna de collar / Collared nightsnake	Found between rocks
Trimorphodon biscutatus (A. M. C. Duméril, Bibron & A. H. A. Duméril) Ilamacoa de noche / Western lyresnake	Not seen by us
Family Crotalidae	
Crotalus muertensis Klauber, 1949 Vibora de cascabel de la Isla El Muerto / El Muerto Island rattlesnake	Found in all habitats

A desert iguana, *Dipsosaurus dorsalis*, looking for its next meal in one of the island's rocky canyonns. Photograph by Gustavo Arnaud.

One important aspect is the pressure from the outside. The creatures of this tiny island are extremely vulnerable to the illegal collecting, indiscriminate killing, and invasive species, factors that significantly affect populations. The resident fauna of this and other islands are exposed to factors that may decrease or extinguish their populations. The introduction of cats (*Felis catus*) has caused the extinction of resident species as documented by Vázquez-Domínguez et al. (2004) and when cats are eradicated this benefits the local herpetofauna (Rodríguez-Moreno et al., 2007).

Both Mexican and international laws are being proposed and carried out to achieve the conservation of the habitat, and of all species populations. We need to develop environmental education among fishermen to make alliances for conservation of the herpetofauna of the islands.

With this study, Isla El Muerto is the home of 8 reptile species. No amphibians have been found, perhaps due to the fact that the island is surrounded by marine waters, making it more difficult for these animals to travel from the peninsula.

Acknowledgments

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Literature Cited

Atlas Geográfico Universal. 2006. Barcelona: Océano.

Case, T. J. 2002. Reptiles: Ecology. Pp. 221-270. *In*: T. J. Case, M. L. Cody and E. Ezcurra, editors, A new island biogeography of the Sea of Cortés. New York: Oxford University Press.

Carreño A. L., and J. Helenes. 2002. Geology and ages of the islands. Pp. 14-40. *In*: T. J. Case, M. L. Cody and E. Ezcurra, editors, A new island biogeography of the Sea of Cortés. New York: Oxford University Press.

Cavazos, T. 2008. Clima. Pp. 67-90. *In*: G. D. Danemann and E. Ezcurra, editors, Bahía de los Ángeles: Recursos naturales y comunidad: Línea base 2007. Mexico: Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT).

CONABIO. 2008. Capital natural de México. Volumen I. Conocimiento Actual de la Biodiversidad. Mexico: Comisión Nacional para el Conocimiento y Uso de la Biodiversidad.

CONANP. 2000. Programa de manejo Área de protección de flora y fauna Islas del Golfo de California, México. Mexico: Comisión Nacional de Áreas Naturales Protegidas.

Cruz-Andrés, O. R. 2011. Dieta de la serpiente de cascabel *Crotalus muertensis*, microendémica de la isla El Muerto, Golfo de California, México, durante la estación seca. Tésis de Licenciatura. Universidad Nacional Autónoma de México.

Delgado-Argote, L. A. 2008. Geología. Pp. 19-44. *In*: G. D. Danemann and E. Ezcurra, editors, Bahía de los Ángeles: Recursos naturales y comunidad: Línea base 2007. Mexico: Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT).

Diamond, J. M. 1989. Overview of recent extinctions. Pp. 37-41. *In*: D. Western and M. C. Pearl, editors, Conservation for the twenty-first century. New York: Oxford University Press.

Dimmitt, M. A. 2000. Biomes and communities of the Sonoran Desert region. Pp. 3-18. *In*: S. J. Phillips and P. W. Comus, editors, A natural history of the Sonoran Desert. Tucson: Arizona-Sonora Desert Museum Press / Berkeley: University of California Press.

Dodd, C. K., Jr. 1987. Status, conservation, and management. Pp. 478-513. *In*: R. A. Seigel, J. T. Collins and S. S. Novak, editors, Snakes: Ecology and evolutionary biology. New York: McGraw-Hill.

Flores-Villela O., and L. Canseco-Márquez. 2004. Nuevas especies y cambios taxonómicos para la herpetofauna de México. Acta Zoológica Mexicana (n. s.) 20(2):115-144.

García-Padilla, E. 2010. Caracterización del hábitat, distribución y tamaño de población de la víbora de cascabel *Crotalus muertensis* (Grismer, 1999), microendémica de la isla El Muerto, Golfo de California, México. Tesis de Licenciatura. Universidad Autónoma de Nuevo León.

Grismer, L. L. 1994a. The origin and evolution of the peninsular herpetofauna of Baja California, México. Herpetological Natural History 2(1):51-106.

————. 1994b. Ecogeography of the peninsular herpetofauna of Baja California, México and its utility in historical biogeography. Pp. 89-125. *In*: P. R. Bown and J. W. Wright, editors, Herpetology of the North American deserts: Proceedings of a symposium. Van Nuys, California: Southwestern Herpetological Society Special Publication No. 5.

————. 1994c. Geographic origins for the reptiles on islands in the Gulf of California, México. Herpetological Natural History 2(2): 17-40.

————. 1994d. The evolutionary and ecological biogeography of the herpetofauna of Baja California and the Sea of Cortés, México. Ph.D. Dissertation, Loma Linda University, Loma Linda, California.

————. 1994e. Three new species of intertidal side-blotched lizards (genus *Uta*) from the Gulf of California, México. Herpetologica 50(4):451-474.

————. 1999a. An evolutionary classification of reptiles on islands in the Gulf of California, México. Herpetologica 55(4):446-469.

————. 1999b. Checklist of amphibians and reptiles on islands in the Gulf of California, México. Bulletin of the Southern California Academy of Sciences 98(2):45-56.

————. 2002. Amphibians and reptiles of Baja California, including its Pacific islands and the islands in the Sea of Cortés. Berkeley and Los Angeles: University of California Press.

Klauber, L. 1949. Some new and revived subspecies of rattlesnakes. Transactions of the San Diego Society Natural History.11:61-116.

Mellink, E. 1995. The potential effect of commercialization of reptiles from Mexico's Baja California peninsula and its associated islands. Herpetological Natural History 3(1):95-99.

Minnich, R. A., E. F. Vizcaìno and R. J. Dezzani. 2000. The El Niño/Southern Oscillation and precipitation variability in Baja California, Mexico. Atmósfera 13(1):1-20.

Murphy, R. W., and G. Aguirre-Léon. 2002. The nonavian reptiles: Origins and evolution. Pp. 181-220. *In*: T. J. Case, M. L. Cody and E. Ezcurra, editors, A new island biogeography of the Sea of Cortés. New York: Oxford University Press.

Rodríguez-Moreno, A., G. Arnaud and B. Tershy. 2007. Impacto de la erradicación del gato (*Felis catus*), en dos roedores endémicos de la Isla Coronados, Golfo de California, México. Acta Zoológica Mexicana (n.s.) 23(1):1-13.

Sánchez-Pacheco, J. Á., B. Tershy and J. L. Aguilar. 2000. Acciones de conservación de las islas de México. Gaceta Ecológica 56:41-45.

SEMARNAT (Secretaría del Medio Ambiente y Recursos Naturales). 2010. Norma Oficial Mexicana NOM-059-SEMARNAT-2010. Protección ambiental—Especies nativas de México de flora y fauna silvestres—Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio—Lista de especies en riesgo. Publicada el 30 de Diciembre 2010.

Tershy, B. R., and D. A. Croll. 1994. Avoiding the problems of fragmentation by conserving natural fragments: The benefits of restoring and protecting small islands. P. 158. *In*: Abstracts, Society for Conservation Biology Annual Meeting, Guadalajara, Jalisco, Mexico.

Vázquez-Domínguez, E., C. Aguilar, V. Aguilar and V. Arenas. 1998. Áreas prioritarias marinas de alta biodiversidad. Pp. 109-126. *In*: L. Arriaga Cabrera, E. Vázquez-Domínguez, J. González-Cano, R. Jiménez Rosenberg, E. Muñoz López and V. Aguilar Sierra, coordinators, Regiones prioritarias marinas de México. Mexico: Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO).

Vázquez-Domínguez, E., G. Ceballos and J. Cruzado. 2004. Extirpation of an insular subspecies by a single introduced cat: The case of the endemic deer mouse *Peromyscus guardia* on Estanque Island, Mexico. Oryx 38(3):347-350.

Bull. Chicago Herp. Soc. 46(10):134-136, 2011

What You Missed at the September Meeting

John Archer
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I'm sorry that you weren't able to partake of my valuable insights gleaned from Carl Franklin's August presentation on *Bipes*, but I had none because I wasn't there. I know that I've previously written about presentations that I haven't attended, but I feel comfortable doing that only if I know the speaker or have a complete video recording of the talk. I fall well short of being a complete conduit for the presentations as it is. It does neither of us any good for me to try and convey what I haven't experienced. For the record, those that were able to make it said that Carl is a dynamic and fun speaker, and the topic certainly is interesting. I had an opportunity to talk with Carl on the phone and, as with all of our speakers, he seems a person one would be happy to share a beer with. I regret not being able to attend.

Photograph of Rich Sajdak by Dick Buchholz.

At the September meeting president Jason Hood and board member Lawrence Huddleston brought back an activity that had been missing for too long. Herp-of-the-Month featured rat snakes in September and a contest was held not only for live snakes brought to the meeting but also of photos submitted to the Facebook page of the CHS, which you need to visit for all the latest news and events going on with your society, including the Herp-of-the-Month for the next meeting. Lawrence is in charge of the contest and is looking for suggestions for animals to feature in the coming months. Steve Sullivan arrived with his trans-Pecos rat snake (*Bogertophis subocularis*) and walked away with the prize of free raffle tickets and numerous comments on the beauty of his animal.

About a week before the meeting I had received a polite email from our speaker asking if he was indeed scheduled to speak at our September meeting. Those who know me realize that while I am not the most competent individual, I do try, and usually I am corresponding with our speakers right up to the time of their talk so that we have everything they need and can make them as comfortable as possible. Because of some other happenings in my life, I lapsed badly this time, and Rich Sajdak had to wonder what he was getting into. Not how your society normally operates!

But Rich seems to be a person difficult to upset, so with the equanimity of the self-confident, he managed to meet a couple of us for dinner and conversation before the meeting, bringing along his now retired professor wife and two friends from the Milwaukee area. He never chastened me for my lack of consideration and between his wife and friends we had a great dinner. I was really looking forward to Rich's talk, because while I hadn't read his book, those that had said nothing but good things about it. Rich completed a 20-year career as aquarium/reptile curator at the Milwaukee Zoo. He's had numerous photos published in books and magazines and written over 40 professional and popular articles. He has done extensive fieldwork on arboreal snakes throughout the Caribbean and studied timber rattle-

Steve Sullivan at the podium with his prize-wiinning herp-of-the-month. Photograph by Dick Buchholz.

One of many species of boa adapted for the arboreal life, the Central American tree boa (*Corallus ruschenbergerii*) demonstrates the great strength often found in tree snakes that allows them to defy gravity. Photograph by Rich Sajdak.

The emerald tree boa(*Corallus caninus*) is one the spectacular arboreal snakes in the competition for the ultimate tree snake. Photograph by Rich Sajdak.

The green tree python (*Morelia viridis*)—this is a juvenile— is the only species of python considered truly arboreal. Photograph by Rich Sajdak.

snakes and rat snakes in Wisconsin. He lives near Rochester, New York, and has recently written *Hunters in the Trees: A Natural History of Arboreal Snakes*. His talk was titled "The Ultimate Tree Snake."

Out of the screen stared the golden eyes of a gorgeous green and yellow Pope's bamboo viper (*Popeia popeiorum*) with that hypnotic gaze that has captured the admiration of so many of us. Rich reminded us that, as a group that feeds primarily on other vertebrates, snakes are astoundingly successful. At over three thousand species, snakes outnumber the two most speciose groups of mammals, bats and rodents. Snakes inhabit much of the earth, from above the Arctic Circle to the deserts and oceans of the world. They are found on land, underground, in water, and in trees. The arboreal snakes are not a natural group such as rattlesnakes, but a group that includes snakes as diverse as Wagler's vipers *(Tropidolaemus wagleri*), boomslangs (*Dispholidus typus*), green mambas (*Dendroaspis angusticeps*) and many of the boas. They eat a wide variety of prey including mammals, reptiles, amphibians, birds, and even frog eggs and snails. Many snakes that are not arboreal spend some time in trees, so what differentiates the arboreal snakes? Rich defines an arboreal snake as " . . . any snake that lives and feeds above ground throughout its life, and has specializations for arboreal life."

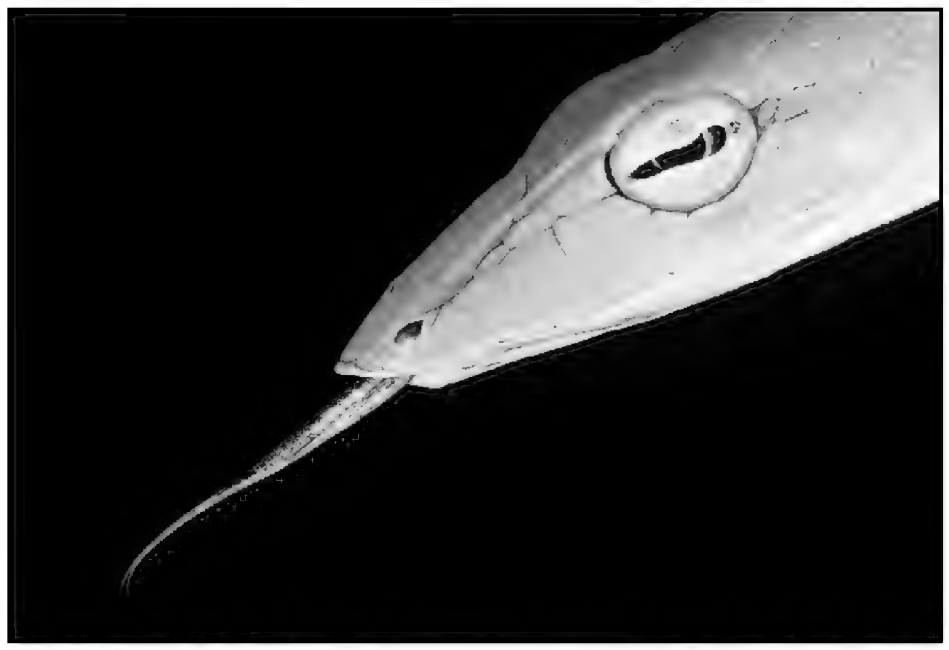
Then Rich took us on a hunt for the ultimate tree snake. With photos of bright yellow eyelash vipers (*Bothriechis schlegelii*), videos of ornate flying snakes (*Chrysopelea ornata*), images of a gaping black mamba (*Dendroaspis polylepis*) and weird-looking leaf-nosed snakes of Madagascar (*Langaha* spp.), Rich asked whether we should look at the spectacular, the unique, the notorious or the bizarre. But first he explored a little of the arboreal snake's adaptations and challenges and why snakes seem to have the edge in arboreal predation.

When one compares a snake to a similar-sized mammal, it quickly becomes apparent why there are so few arboreal mammalian predators and no large ones. Snakes have low centers of balance with their body weight spread over a much longer area. They have the ability to take large prey infrequently and can go long periods without eating at all. They are very secure in trees, especially those with prehensile tails, and are nearly impossible to dislodge. While they are constantly fighting gravity, they have thin but strong bodies, longer tendons and ligaments and elaborate grooves and processes on the vertebrae that allow them to stretch across the gaps in the canopies. And they are, on average, smaller than their terrestrial cousins but with large eyes than allow them to spot distant prey and large heads that allow them to swallow large prey.

Rich started with a cool photo of a black rat snake (*Pantherophis obsoleta*) swallowing a bat in his search for the ultimate tree snake, but quickly eliminated them because, while they are more arboreal than many researchers believe, they are still only a transitional species to a true arboreal life. Spectacular photos of the red-tailed green rat snake (*Gonyosoma oxycephalum*) of Southeast Asia or the green mamba (*Dendroaspis angusticeps*) of Africa with their slender bodies and green colors might better illustrate the ultimate tree snake, or even the black and gold of *Spilotes pullatus* in the New World tropical forests. Rich wasn't yet ready to award top honors.

What about the constrictors of the nocturnal shift such as the Madagascan tree boa (*Sanzinia madagascarensis*) or the green tree python (*Morelia viridis*) of Australia, the only python considered truly arboreal? Or the extensive adaptations of the vine snakes surely make them top contenders for the title ultimate tree snake. A picture of an Asian vine snake (*Ahaetulla nasuta*) demonstrated the adaptations of many of the snakes in this diurnally active group. With its tongue held straight out, perhaps acting as a pointer, the snake can look forward along its pointed snout and use what is probably binocular vision to strike half of its body length when capturing the fast moving lizards and birds that make up much of its diet. Pictures of tree snakes from around the world that have adopted this body plan filled the screen.

He next considered the vipers, a group that one would not



The green vine snake (*Ahaetulla nasuta*) of Asia is one of the "sniper" snakes, diurnal snakes that pursue fast-moving lizards and birds. Photograph by Rich Sajdak.

The brown vine snake (*Oxybelis aeneus*) demonstrates the pointed snout, large eyes and head, and narrow body that the vine snakes have evolved. Photograph by Rich Sajdak.

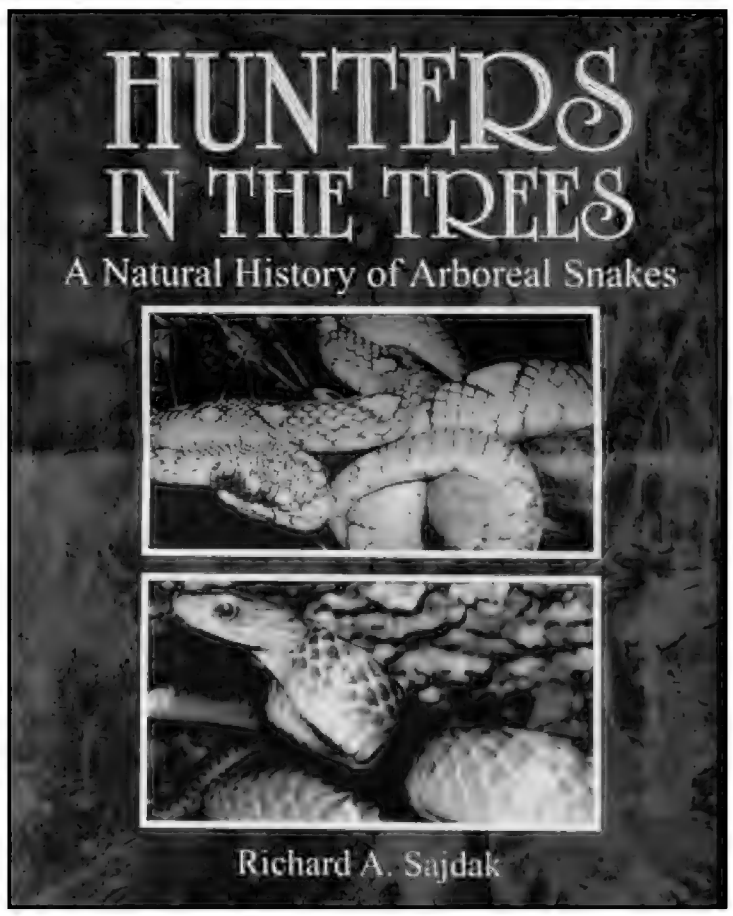
normally associate with arboreal activity, but represented by several species. Photos of a bamboo viper from Southeast Asia, a palm viper from Central America and a snub-nosed looking bush viper from Africa provided a few examples. Rich gave us a little history of the Shedao mamushi (*Gloydius shedaoensis*), an arboreal viper that crowds an island off the coast of China. Huge numbers of these snakes exist on such a small piece of land because the snakes feed on migrating birds. The twice-a-year bounty could not sustain any other predator in the numbers that this snake maintains, but this life style has arisen on islands off Brazil and Belize and in the Gulf of California and the Mediterranean.

Rich considered the cat snakes of the Old World next, with multiple pictures of *Boiga* species flashing before us. This niche is filled in Africa by the nearly identical but unrelated Blanding's tree snake (*Toxicodryas blandingii*), another case of convergent evolution.

Rich announced what he considered most people would judge as the ultimate after a little history. The clean-up in the Pacific after World War II introduced the brown tree snake (*Boiga irregularis*) to the island of Guam, which previously had no snakes at all. At first it was simply a matter of curiosity, but when indigenous birds began to disappear and no other cause could be determined it was discovered that the brown tree snake had found its ideal habitat. The snake wreaked havoc on the island's ecology and caused multiple problems for the human inhabitants. Power outages were common as the snakes short-circuited power lines and the snakes even attacked newborn human babies. Control methods such as trapping were put in place and continue but even though the traps are effective, the snakes reproduce too rapidly to be eliminated. The fear is that they will be introduced and become established on other isolated Pacific islands, especially the transportation hub that Hawaii has become. From there the snake could spread almost anywhere. Certainly not an endearing champion, but obviously an animal that exhibits as much success as the brown tree snake could be the ultimate tree snake.

Rich wasn't going to leave us alone with our unsavory thoughts of this invasive creature as the ultimate tree snake, so he clicked another slide and gave us a picture of a blunt-headed tree snake (*Imantodes cenchoa*), his favorite tree snake. Incredibly slim and long, with big round eyes and an oversized head, ending his talk with pictures of these fascinating little snakes allowed us to leave the meeting feeling as though we had something to cheer for other than the brown tree snake.

Once again I have to remind you that these write-ups reveal a small part of the presentations that we are privileged to hear. Rich filled his talk with anecdotes and fascinating facts, and always the reader forgoes the pure pleasure of the amazing photographs and videos. And the reader doesn't get the chance to ask questions of the experts. Come to the meetings if you can. Feel frustrated if you can't. Rich never mentioned his book during his talk and while much of the presentation came from the book, many of the photos are not in the book and the book contains much more information. I've just got my copy and I'm excited about reading it. Buy it. You won't be sorry. Rich writes as well as he talks. We were fortunate to have him as a speaker.



Herpetology 2011

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

VERIFIED NON-INDIGENOUS FLORIDA HERPS

K. L. Krysko et al. [2011, Zootaxa 3028:1-64] note that it is crucial to provide data on all known non-indigenous herpetofaunal species via vouchers to help keep numbers of species consistent, accurately identify species, document when and where a particular species is found, and identify the invasion pathway and current invasion stage of each species. In this study, the authors use vouchers to confirm interceptions and introductions of all known non-indigenous amphibians and reptiles in Florida from 1863 through 2010, provide a list of these species along with their invasion pathways and current ecological status (i.e., invasion stage), and provide a species account for each newly confirmed species. This report includes species that were previously reported in the literature but lacked an associated voucher and provides greater details on previously reported species and those species whose invasion stage has been upgraded to established (stages 3–5). Based on nearly two decades of field work along with examination of museum records and literature, the authors confirm three intercepted and 137 introduced amphibian and reptile taxa in Florida. Of these, 56 are established (i.e., reproducing; stages 3–5), including three frogs, four turtles, one crocodilian, 43 lizards, and five snakes. Of 149 total independent introduction pathways (i.e., including a different pathway one time only for each taxon) for the 140 total non-indigenous taxa above, two (1.34%) are related to the biological control pathway, four (2.68%) to the zoo pathway, 18 (12.08%) to the cargo pathway, and 125 (83.89%) to the pet trade pathway. Florida now ranks as having the largest number of established non-indigenous herpetofaunal species in the entire world. Despite current state laws that make it illegal to release any non-indigenous animal in Florida without first obtaining a permit from the Florida Fish and Wildlife Conservation Commission, enforcement is difficult, and no person has ever been prosecuted for the establishment of a non-indigenous animal species in Florida. Because current legislation has not been effective in curtailing the ever-increasing number of illegal introductions, laws need to be modified and made enforceable. Those responsible for introductions should be held accountable for compensation to clean up (= eradicate) those species for which they are responsible. The authors strongly support the creation of an Early Detection and Rapid Response program to quickly deal with newly found introduced species. This paper will also serve as a baseline to document future introductions.

TAIL COLOR AND FORAGING SUCCESS

T. M. Farrell et al. [2011, J. Herpetology 45(3):291-293] conducted a field experiment to test the adaptive significance of tail color. A sample of 169 neonate pigmy rattlesnakes (*Sistrurus miliarius*) was treated by coloring their yellow tails with either black pigment similar to their cryptic body color or yellow ink as a procedural control. Snakes were released and recaptured over the next three months. Tail color manipulation did not significantly influence the proportion of snakes with palpable food. Also, the treatments did not affect growth in SVL or mass. These findings suggest that snakes with cryptic tails did not experience reduced prey capture. The presence of conspicuous tail coloration in this species may be explained by phylogenic inertia, selective benefits of small magnitude, or by habitat-related differences in prey composition or abundance.

WHEN SOUNDS COLLIDE

K. Kaiser et al. [2011, Behaviour 148(2):215-232] note that many organisms depend on acoustic communication, and have evolved behaviors to minimize effects of naturally occurring acoustic interference. However, as habitats are subject to increased alteration, anthropogenic noise becomes unavoidable, and how animals overcome such interference is not well understood. In most ecosystems, only a subset of frog species is associated with disturbed habitats; the ability of these species to overcome exogenous noise suggests that habitat associations may be related to species' response to noise. The authors tested the hypothesis that frogs associated with largely undisturbed forest habitat would be less likely to increase call output in response to exogenous noise than would those associated with disturbed or open habitat. While this relationship was not significant, a slight trend supporting the hypothesis was found. The next question was whether anthropogenic noise affects chorus tenure at individual—or at chorus—levels. Male frogs exposed to anthropogenic noise decreased both the number of days present at the chorus and the nightly chorus duration relative to controls. Because females generally join choruses late at night to breed, the effects of noise found here are likely to substantially decrease frog reproductive success; thus, the acoustic environment may play an important role in shaping population dynamics and in amphibian declines.

FEMALE TERRITORIALITY IN A FROG

I. Meuche et al. [2011, Copeia 2011(3):351-356] note that females of the strawberry poison frog (*Oophaga pumilio*) are known to be aggressive toward other females. They hypothesized that females are territorial, occupying and defending specific areas in defense of food resources. To test this hypothesis, they calculated the position and size of core areas and home ranges for each female in the study area and the frequency of aggressive and feeding behavior exhibited by females in these areas. They provide evidence, for the first time, that females are territorial; they defend their core area against other intruding females. To determine the potential resource defended by females, they examined aggressive behavior associated with defense of mates, oviposition, and tadpole-rearing sites. They found no evidence that females defended areas with males, or that oviposition and tadpole-rearing sites were limited and defended by females. Instead, the observations suggest that female territoriality is most likely associated with the defense of feeding areas.

Unofficial Minutes of the CHS Board Meeting, September 16, 2011

The meeting was called to order at 7:44 P.M. at the Schaumburg Public Library. All board members were present.

Officers' Reports

Recording Secretary: Cindy Rampacek read the minutes of the July 15 board meeting (no meeting was held in August), which were accepted with minor corrections.

Treasurer: Andy Malawy gave a quick summary of both July and August financial reports. He also reported that the AT&T situation should be resolved finally. We will be renewing our Chicago Wilderness membership.

Membership Secretary: Mike Dloogatch read a list of memberships expiring this month as well as an expired member.

Sergeant-at-arms: Greg Brim reported that he was not at the general meeting. The consensus was that about 49 attended.

Corresponding Secretary: Deb Krohn passed along one of the people at a show she was doing gushed about one of our members who was showing animals at the Museum of Science and Industry Members' Night. They plan to join the CHS based on that experience.

Committee Reports

Shows:
- Unity Walk at Soldier Field, September 24
- NARBC Tinley Park, October 8 & 9
- Snake Day at the Milwaukee Public Museum, November 5

Dick reported that he, Mike Scott and Lawrence Huddleston represented the CHS with an exhibit of live animals at Unity Fest in Marquette Park on September 10. It was wonderful and the community was welcoming.

ReptileFest: New business cards are being printed. We will have a free ad on the chicagofun.com website through Froglady.

Nominating Committee: Cindy read the tentative slate. The committee is still reaching out to people.

Old Business

St. Louis Zoo trip: Linda Malawy took a tentative final count to give the zoo. She is also compiling a cell phone list.

New Business

Awards Committee: The sergeant-at-arms chairs this committee members-at-large serve as committee members. This year that means Greg Brim as chair and Jim Foster, Lawrence Huddleston, Linda Malawy and Jenny Vollman as members. Dick Buchholz said that he would pass along the information from previous years.

Website/Forum: The free forums are all easily hacked and easy to place viruses on. Aaron suggested we look at either paying for a forum database or just get rid of it. Our issue was that hackers got into our site through back doors on the forum. Aaron is leaning heavily to kill the forum, as is Jason. A discussion ensued, so the forums will be let go and we will use both the fan page and group currently on facebook.

NARBC table: Lawrence will manage rounding up and keeping track of the volunteers.

Holiday party: Deb Krohn will again plan the holiday party for us.

Round Table

Aaron picked up some awesome Madagascar big-eyed geckos on the way back from Daytona..

Jessica is digging the new job and she will also have her pendants for sale at Croctoberfest at the Lake Forest Wildlife Discovery Center.

Deb got a gopher tortoise and thanks to Linda, she knows what to do with it.

Mike wanted to know if everyone saw the nice photo of Jenny in *Time Out Chicago*.

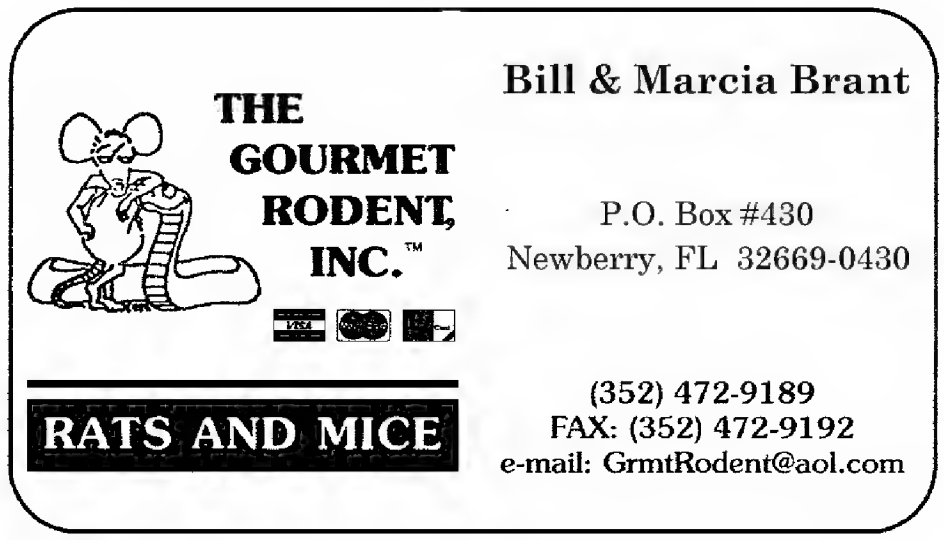
Cindy said it was a LONG summer. She did enjoy having a few drinks with Mike in Texas.

Lawrence will be heading to Rockford for herping.

Nick was in contact with Bass Pro and they are very open to getting the CHS in to do shows.

The meeting was adjourned at 9:12 P.M.

Respectfully submitted by recording secretary Cindy Rampacek



Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, PO Box 430, Newberry, FL 32669-0430, 352-472-9189, E-mail: GrmtRodent@aol.com.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. Our mice and rats are vacuum-packed to greatly extend freezer life by reducing freezer burning and preserving vitamin and nutrient content. We feed our colony a nutrtionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. For a complete price list please visit our web site, www.themousefactory.com. We accept all major credit cards, PayPal or money orders. Call us **toll-free** (800) 720-0076 or send us an e-mail at info@themousefactory.com. Write us at PO Box 85, Alpine TX 79831.

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice availabe: small newborn pinks up to jumbo adults. Prices start at $25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: Trophy quality jungle carpet, diamond-jungle, and jaguar carpet pythons. Website: moreliatrophyclub.com E-mail: junglejohn@tds.net.

Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds,and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site http://hiss-n-things.com and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney 305 664-2881

Herp tours: The beautiful Amazon! Costa Rica from the Atlantic to the Pacific! Esquinas Rainforest Lodge, the Osa Peninsula, Santa Rosa National Park, and a host of other great places to find herps and relax. Remember, you get what you pay for, so go with the best! GreenTracks, Inc. offers the finest from wildlife tours to adventure travel, led by internationally acclaimed herpers and naturalists. Visit our website <http://www.greentracks.com> or call (800) 892-1035, E-mail: info@greentracks.com

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

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News and Announcements

2012 CHS HERPETOLOGICAL GRANTS PROGRAM

The mission of the Chicago Herpetological Society is education, conservation and the advancement of herpetology. To further this mission, the CHS provides grants of up to $1,000 in the following categories:

1. Illinois Herpetology
2. Graduate Student Research in Herpetology
3. Undergraduate Research in Herpetology
4. Conservation
5. Captive Management, Husbandry and Propagation

The number of grants awarded in each category will depend on the grant applications received; it is possible that not all categories will receive awards and some categories may receive more than one award. The Grants Committee reserves the right to reassign the category under which a given proposal is submitted.

To qualify for a grant, the applicant must be a member of the Chicago Herpetological Society as of December 31, 2011. In accepting a grant, the recipient agrees to acknowledge the Chicago Herpetological Society in any publications or public presentations of research funded by this grant. Further, the recipient agrees to abide by all state and federal laws.

Recipients must submit a short report of their research findings to the CHS within 6 months of their anticipated completion date. The report should be written for a general audience and be suitable for publication in the CHS *Bulletin* or on the CHS webpage. This requirement may be waived if results will be published in a peer-reviewed journal within a year. Recipients may be invited to present a program at a CHS general meeting.

Applications must include the following:

1. Project title
2. Applicant's name, address, phone and email
3. Submission category
4. Introduction—Provide background for the proposed work. Include a clear statement of the objectives of the proposed work.
5. Materials and methods—Describe the study site and the materials and methods (in non-technical terms) that will be used to accomplish the objectives of the proposed research. Attach plans, diagrams and maps as necessary. Indicate whether you have an approved Animal Care (IACUC) protocol covering the proposed methods or whether you will be submitting such a protocol.
6. Applicability and broader implications—How does this work apply to conservation, education and the advancement of herpetology?
7. Budget—Indicate the budget for the entire project and make clear what portion the CHS grant money would fund.
8. Anticipated completion date for the research
9. Applicant curriculum vitae
10. Letters of support — Student applicants must include a letter of support from a faculty advisor. For non-academic individual and institutional applicants, letters of support from collaborating partners or institutions are strongly encouraged. Letter(s) of support may be emailed and should include an address and phone number at which the writer can be contacted. Letter(s) of support may also be sent by postal mail.

Proposals should be submitted as email attachments. Attachments should include the applicant's name in the file name. Proposal text should not exceed five double-spaced pages (excluding literature cited, applicant's CV, and letters of support) and should be typed using a common font (e.g., Arial, Times, Courier) no smaller than 10pt. Applications must be received by December 31, 2011, and awards will be announced by February 15, 2012.

Proposals should be emailed to grants@chicagoherp.org

Questions should be directed to Mike Dloogatch (773) 588-0728, or grants@chicagoherp.org

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, October 26, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Dr. Joseph R. Mendelson III**, curator of herpetology at ZooAtlanta and current president of the Society for the Study of Amphibians and Reptiles, will speak about his work with declining amphibian populations. Dr. Mendelson has been studying Neotropical amphibians and reptiles for 20 years, concentrating mostly on Mexico and Central America. In recent years, Dr. Mendelson has redirected much of his energy into conservation programs to help save amphibians, to elucidate the root causes of their declines, and to conceive and implement pro-active conservation programs. This professional transition included transferring from a tenured academic appointment at a university to a research and conservation position at a zoo.

The November 30 meeting will include the annual election of officers and members-at-large of the CHS Board of Directors. And we'll have an interesting program as well.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

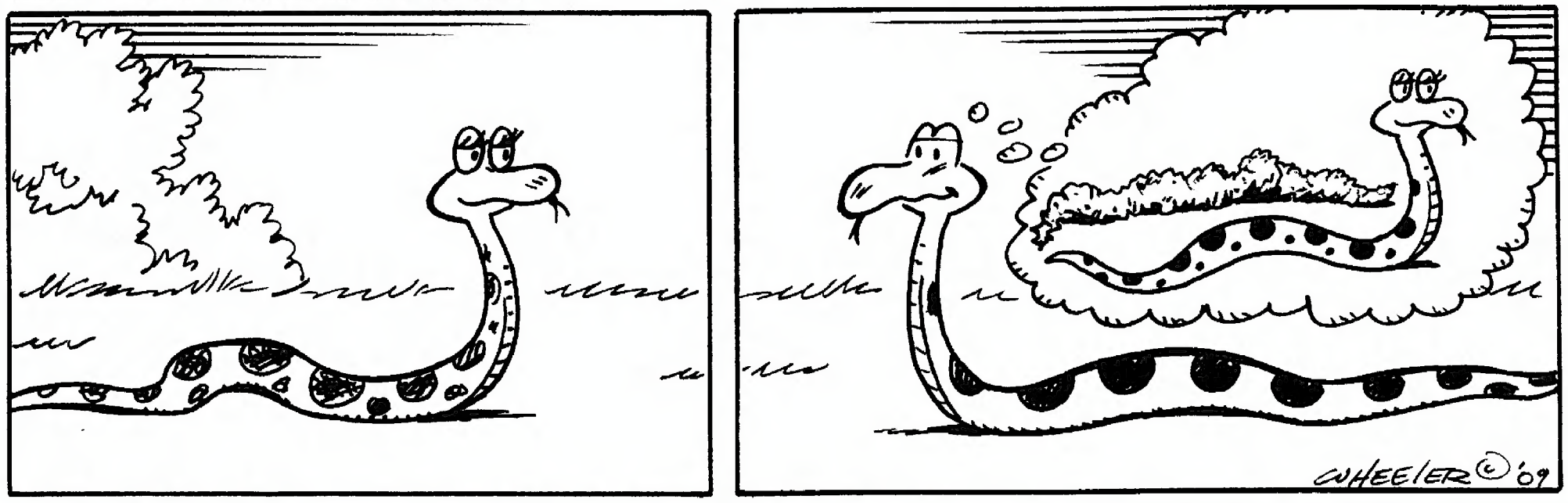
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., November 18, in the adult meeting room on the second floor of the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the CTC website: http://www.geocities.com/~chicagoturtle.

THE ADVENTURES OF SPOT



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